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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/471,071	12/21/1999	TONGBI JIANG	MICRON.110A	6968

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EXAMINER

ALCALA, JOSE H

ART UNIT	PAPER NUMBER
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2841

DATE MAILED: 12/10/2001

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/471,071

Applicant(s)

JIANG, TONGBI

Examiner

Jose H Alcalá

Art Unit

2841

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 September 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) 1-7 and 24 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 8-23 and 25-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 December 1999 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3 and 4. 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group II, Species 3 readable claims 8-23, 25-27 in Paper No. 8 is acknowledged. However upon further review, the Election of Species has been vacated. An action on the merits will be given for Group II and readable claims 8-23, 25-27.

Drawings

2. Figures are improperly crosshatched. All of the parts shown in the section, and only those parts, must be crosshatched. The crosshatching patterns should be selected from those shown on page 600-81 of the MPEP based on the material of the part. See also 37 CFR 1.84(h)(3) and MPEP 608.02.
3. The drawings are objected to because: in Figure 1C the thick layer of adhesive material is labeled with Reference Number 80, which is used to label a thin layer of adhesive material. In addition in Figure 2 the thick layer of adhesive material is labeled with Reference Number 80, which is used to label a thin layer of adhesive material. Furthermore, Figure 2 is not clear regarding where it ends, and where starts the cross section, because there are no lines at the right part of the Figure. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

4. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: Reference Number 88. A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

5. The disclosure is objected to because of the following informalities: In page 5, line 30 the Reference Number 50 is called "leads", while in page 8, lines 13,14 and 15 it is called "tape". In addition, in page 8, lines 3 and 20 the Reference Number 80 is called "die attachment layer", while in page 5 line 25 it is called "thin layer of adhesive material". It is important to use constant terminology throughout the disclosure to improve the clarity of the invention. Furthermore, in pages 1-13, the first line of each page has some words that are not completely readable.

Appropriate correction is required.

Claim Objections

6. Claim 25 objected to because of the following informalities: In lines 10 and 11 of claim, delete the sentence "The integrated circuit package of Claim 25, wherein the flexible substrate is a polyimide." and add it as a separate claim. Appropriate correction is required.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 9,12-14,16,17-20,21-23,26-27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 9 and 16 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: How the flexible tape is located in relation to the die and the die attach layer.

Claims 12-14, and 18 are unclear, regarding if the ball grid array, the tape ball array and the micro ball array are separate from the original array of solder balls of Claim 8, or if there are two plurality of solder balls.

Claim 17 recites the limitation "the first level package" in line 3. There is insufficient antecedent basis for this limitation in the claim. In addition, it is not clear how the chip is connected to a first level package or if the chip is the first level package, and how a first level package can comprise a second level package in itself and be connected to it at the same time. In addition, it is not clear how the solder balls can be used to connect the first level package to the second level package and still have the adhesive layer in between the chip and the array of solder balls. It is further unclear how

the flexible tape is located in relation to the other elements of the package, as the balls array and the adhesive layer.

Claim 21 recites the limitation "the first level package" in line 3. There is insufficient antecedent basis for this limitation in the claim. In addition, it is not clear how the chip is connected to a first level package or if the chip is the first level package, and how a first level package can comprise a second level package in itself and be connected to it at the same time. In addition, it is not clear how the solder balls can be used to connect the first level package to the second level package and still have the adhesive layer in between the chip and the array of solder balls. It is further unclear how the flexible tape is located in relation to the other elements of the package, as the balls array and the adhesive layer.

Claims 26 and 27 are unclear regarding if the conductive terminals are solder balls, or if the balls are a separate piece connected to the terminals.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 8,10-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsuan (US Patent No. 6,239,367). As best understood by the examiner:

Regarding Claims 8 and 15, Hsuan et al. teaches an integrated circuit package, comprising: a die (Reference Number 56); a die attach layer (Reference Number 76); over the die; and an array of solder balls (Reference Number 72) over the die attach layer.

Hsuan fails to explicitly teach that the die attach layer has a coefficient of thermal expansion of less than about 106 ppm/°C, and that the modulus of elasticity is and a modulus of elasticity of less than about 126 ksi.

It is well known in the art to use different adhesive materials according to the desired properties needed to manufacture and use the device. It would have been obvious to one of ordinary skill in the art at the time of the invention to use the adhesive having the set of properties desired, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416. In addition, it has been held that discovering an optimum value or range of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980) and In re Aller, 105 USPQ 233.

Regarding claim 10, Hsuan et al. fails to explicitly teach that the die attach layer has a thickness of between about 5 and 7 mils. It is well known in the art to change the thickness of an adhesive layer in order to make the device more or less flexible as desired, and to make sure that the needed amount of adhesive is available. It would have been obvious to modify the Hsuan reference in order to make the die attach layer having a thickness of between about 5 and 7 mils, in order to make the device more or

less flexible as desired, and to make sure that the needed amount of adhesive is available. In addition, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Regarding Claim 11, Hsuan fails to explicitly teach that the die attach layer is an epoxy modified with elastomeric material. It is well known in the art to use different adhesive materials according to the desired properties needed to manufacture and to use the device. It would have been obvious to one of ordinary skill in the art at the time of the invention to use the adhesive having the set of properties desired, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Regarding Claims 12-14, Hsuan fails to explicitly teach that the package includes a ball grid array, a tape ball grid array or a micro ball grid array. It is well known in the art to use any of those methods to connect a package to a printed circuit board. It would have been obvious to one of ordinary skill in the art at the time of the invention to use any of these methods to effectively connect the package to a printed circuit board, using conventional methods and the selection of any of these known equivalents would be within the level of ordinary skill in the art.

Regarding Claims 9 and 16, DiStefano teaches a flexible film carrier (Reference Number 58) so it is inherent that the insulating layer (Reference Number 60) is a flexible tape.

11. Claim 17-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over DiStefano (US Patent No. 6,127,724). As best understood by the examiner:

Regarding Claim 17, DiStefano teaches a first level integrated circuit package, comprising: a chip (Reference number 32); an array of solder balls (Reference number 62); an adhesive layer (Reference number 50) between the chip and the array of solder balls, and a flexible tape (Reference number 20) connecting the array to the chip. The limitation: "for connecting the first level package to a second level package" is an intended use limitation and it has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. Ex Parte Masham, 2 USPQ F.2d 1647 (1987).

DiStefano fails to explicitly teach that the adhesive layer has a coefficient of thermal expansion of less than about 200 ppm/°C. It is well known in the art to use different adhesive materials according to the desired properties needed to manufacture and use the device. It would have been obvious to one of ordinary skill in the art at the time of the invention to use the adhesive having the set of properties desired, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416. In addition, it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Regarding Claim 18, the limitation "that the tape connects the array to the chip using μ BGA technology" is a product by process limitation. If the product in the product-by-process claims are the same as or obvious from a product of the prior art, the claims are unpatentable even though the prior product was made by a different process. See *In re Thorpe*, 227 USPQ 964,966 (Fed.Cir 1985). A "product by process" claim is directed to the product per se, no matter how actually made, *In re Brown*, 173 USPQ 685; *In re Luck*, 177 USPQ 523; *In re Fessmann*, 180 USPQ 324; *In re Avery*, 186 USPQ 161; *In re Wertheim*, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); *In re Marosi et al*, 218 USPQ 289; and particularly *In re Thorpe*, 227 USPQ 964, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that applicant has the burden of proof in such cases, as the above case law makes clear.

Regarding claims 19 and 20, DiStefano fails to explicitly teach that the adhesive layer has a coefficient of thermal expansion of less than about 150 ppm/ $^{\circ}$ C, or less than about 100 ppm/ $^{\circ}$ C. It is well known in the art to use different adhesive materials according to the desired properties needed to manufacture and use the device. It would have been obvious to one of ordinary skill in the art at the time of the invention to use the adhesive having the set of properties desired, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

In addition, it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Regarding Claim 21, DiStefano teaches a first level integrated circuit package, comprising: a chip (Reference number 32); an array of solder balls (Reference number 62); an adhesive layer (Reference number 50) between the chip and the array of solder balls, and a flexible tape (Reference number 20) connecting the array to the chip. The limitation: "for connecting the first level package to a second level package" is an intended use limitation and it has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. Ex Parte Masham, 2 USPQ F.2d 1647 (1987).

DiStefano fails to explicitly teach that the adhesive layer has a coefficient of thermal expansion of less than about 200 ppm/°C; wherein the adhesive layer has a modulus of elasticity of greater than about 10 ksi and less than about 126 ksi. It is well known in the art to use different adhesive materials according to the desired properties needed to manufacture and use the device. It would have been obvious to one of ordinary skill in the art at the time of the invention to use the adhesive having the set of properties desired, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416. In addition, it has been held that discovering an optimum value or range of a result effective variable involves

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only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980) and In re Aller, 105 USPQ 233.

Regarding Claims 22 and 23, DiStefano fails to explicitly teach that the adhesive layer has a modulus of elasticity of greater than about 50 ksi or of greater than about 100 ksi. It is well known in the art to use different adhesive materials according to the desired properties needed to manufacture and use the device. It would have been obvious to one of ordinary skill in the art at the time of the invention to use the adhesive having the set of properties desired, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416. In addition, it has been held that discovering an optimum value or range of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980) and In re Aller, 105 USPQ 233.

12. Claims 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kovac et al. (US Patent No. 5,659,952). As best understood by the examiner:

Regarding Claim 25, Kovac teaches an integrated circuit package, comprising: a flexible substrate (Reference Number 100); a chip (Reference Number 120); a plurality of conductive terminals (Reference Number 140) on the substrate; a plurality of conductive leads (Reference number 150) electrically connecting the conductive terminals to the chip; and a compliant material between the chip and the substrate (Reference Number 170).

Kovac fails to explicitly teach that the compliant material has a modulus of elasticity of less than about 126 ksi at room temperature and a coefficient of thermal expansion of less than about 200 ppm/°C. It is well known in the art to use different adhesive materials according to the desired properties needed to manufacture and use the device. It would have been obvious to one of ordinary skill in the art at the time of the invention to use the adhesive having the set of properties desired, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416. In addition, it has been held that discovering an optimum value or range of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980) and In re Aller, 105 USPQ 233.

Regarding Claim 26 and 27, Kovac fails to explicitly teach that the plurality of conductive terminals includes an array of solder balls or TAB leads. It is well known in the art to use any of those methods to connect a package to a printed circuit board. It would have been obvious to one of ordinary skill in the art at the time of the invention to use any of these methods to effectively connect the package to a printed circuit board, using conventional methods and the selection of any of these known equivalents would be within the level of ordinary skill in the art.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following references have some of the elements of the

instant claimed invention: Mertol et al. (US Patent No. 6,114,761), Venkateshwaran et al. (US Patent No. 6,316,822), MacQuarrie et al (US Patent No. 6,131,278), Wille et al. (US Patent No. 5,821,456), Lake (US Patent No. 6,251,211), Hsuan et al (US Patent No. 6,239,366) and Strecker (US Patent No. 5,030,816).

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jose H Alcala whose telephone number is (703) 305-9844. The examiner can normally be reached on Monday to Friday.

15. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jeffrey Gaffin can be reached on (703) 308-3301. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-3431 for regular communications and (703) 305-3431 for After Final communications.

16. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

JHA
December 3, 2001

 12-6-01
ALBERT W. PALADINI
PRIMARY EXAMINER